Integrated Advanced Monopropellant CMC Thruster / Thermal Stand-Off Assembly, Phase I

Completed Technology Project (2005 - 2005)

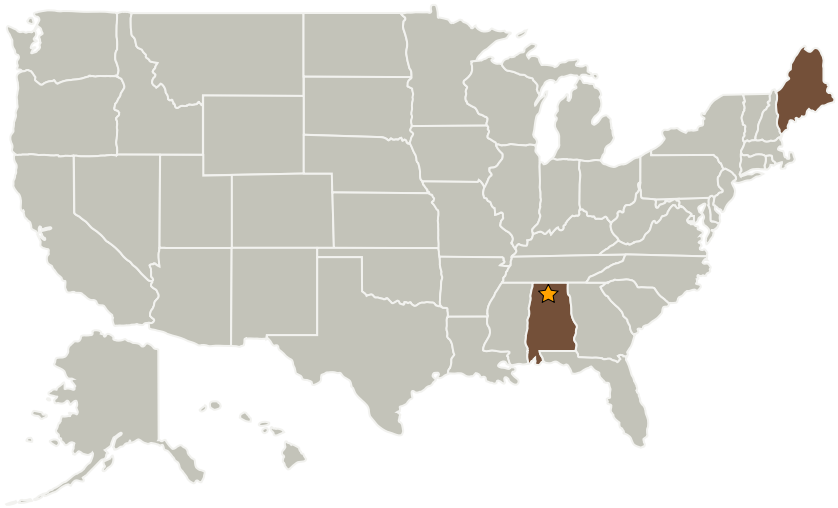
Project Introduction

High performance non-toxic monopropellants offer significant benefits relative to the current state-of-the-art. The benefits of these advanced monopropellants (AMP) include improved safety, a 50% reduction in density, and a 20% improvement in specific impulse (ISP). AMP propulsion represents a significant challenge for thruster components and assemblies due to the higher temperatures and the chemical constituents of the exhaust. This proposed program, with the support of Aerojet Redmond, will develop, design and fabricate an integrated ceramic matrix composite (CMC) thruster assembly comprised of the thermal stand-off (TSO), combustion chamber, and nozzle. The TSO will mitigate heat soak-back to the propellant valve utilizing an insulating CMC operating with a combustion environment greater than 2000

o

C. A phased design plan will be used for developing the integrated thruster assembly and results confirmed by test firing under representative conditions. A TSO prototype will be fabricated and the thermomechanical and thermochemical properties tested and analyzed during the Phase I program. The Phase II will utilize the TSO, materials development and conceptual design from the Phase I to develop an integrated CMC TSO - combustion chamber and nozzle assembly. A successful program will provide technology benefits resulting from improved performance, reduced cost and improved manufacturability.

Primary U.S. Work Locations and Key Partners



Integrated Advanced Monopropellant CMC Thruster / Thermal Stand-Off Assembly, Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Integrated Advanced Monopropellant CMC Thruster / Thermal Stand-Off Assembly, Phase I

Completed Technology Project (2005 - 2005)

Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Fiber Materials, Inc.	Supporting Organization	Industry	Biddeford, Maine

Primary U.S. Work Locations	
Alabama	Maine

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Ralph Langensiepen

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.4 Electrothermal